

Implementation of "**Shivkalin Pani Sathawan Yojana**", the scheme for augmentating the availability of water for Drinking and Domestic use and Strengthening of Drinking Water Sources by utilising Rainwater.

**Government of Maharashtra,  
Water Supply & Sanitation Department,  
Government Resolution No. RWS 1001/CR-330/ WS-07,  
Mantralaya, Mumbai-400 032, Dated 14th February,2002.**

**READ :** 1) Government Circular, W.S. & S.D.No.RWS-098/CR 215/ WS-07, Dated the 11th November,1998,  
2) Government Resolution, W.S. & S.D. No. RWS 1099/CR 328/WS-07, Dated the 27th July,2000,  
3) Government Resolution, W.S. & S.D. No. SCY 3000/CR 159/WS-14, Dated the 28th Sept.,2000,  
4) Government Resolution, W.S. & S.D. No. RWS 1001/ CR 190/WS-07, Dated the 3rd Sept.,2001,

**PREAMBLE:**

Groundwater is the main source for drinking water in rural areas. Almost 85% schemes in rural areas are based on groundwater. However, due to over-exploitation of groundwater and inadequate recharge, such sources dry up, resulting in failure of the schemes. Government of Maharashtra, since the creation of this State, has adopted various measures for drinking water supply to rural and urban areas. Inspite of spending thousands of crores of rupees over the years, even now many villages/wadis do not get adequate potable drinking water. Where various drinking water supply schemes have been taken up, water from surface or groundwater sources at considerable distance has to be brought for piped water supply schemes. The main reason for this is the drying up of the original source(s).

2. It is, therefore, necessary to lay greater emphasis on strengthening the drinking water sources by recharge. However, instead of doing that as soon as a source goes dry, emphasis is given on taking up a new scheme. One more reason for this is that, the water supply schemes include expenditure for items like development of source, distribution, stand-posts, but no provision is made for strengthening, of the source if it falls inadequate.

3. As mentioned above, majority of water supply schemes are based on groundwater sources. Some efforts have been made for strengthening of such sources through adoption of various water conservation measures and improving the over-all water levels. However, the additional water made available by such recharge is used not necessarily for drinking water purposes only but also harvested by some people for other purposes. The main reason for that is that the **right to groundwater** has not been established by any legislation unlike in the case of surface water. It is generally assumed that groundwater available under a piece of land belongs to the owner of the land and he can use it as he wants.

4. In order to alleviate the scarcity of drinking water, Government has enforced the Maharashtra Groundwater (Regulation for Drinking Water Purposes) Act, 1993 and Rules thereunder in 1995. The Collectors of the districts have been empowered to protect the drinking water sources through the provisions of the Act / Rules, but it has not helped much.

5. Instead of relying on just the legal provisions, for **proper planning and management of water** resources by the **village community** by considering that the water available in the village as a community resource as a whole and giving priority to the drinking water, especially in respect of villages which consistently face drinking water scarcity and are tankered, Government had issued instructions vide Resolution dated 28 September 2000 referred to at Reference No.3 above, regarding implementation of a "**Three pronged Strategy**". However, effective implementation of this Government Resolution at the village level has not commenced as yet.

6. As per the circular dated 11<sup>th</sup> November 1998 referred at Reference No. 1 above, instructions were issued by this Department to all the implementing agencies for taking up measures for rainwater harvesting for its use for drinking. However, the implementing agencies do not appear to have taken up any programme to that effect.

7. Even if the water storage in **watersheds** is augmented by taking conventional water conservation measures, it will be practically and politically difficult to impose restrictions on its extraction and use for irrigation and other purposes, so as to preserve adequate quantity for drinking purposes.

8. During the last year's scarcity period, tankers had to be made available on a large scale and many other scarcity relief measures had to be taken up. The main reason behind this has been found to be **the depletion or drying up of the sources of water** even when the system of the water supply scheme is available in the concerned village.

9. Under various **water conservation** measures, the **recharge to groundwater** is basically received from rainwater. Hence, it would be appropriate if the **rainwater could be**

**directly used for groundwater recharge** or used **directly for drinking purposes in view or its purity**. Under these circumstances, it was under consideration of the Government to take up a programme and implement a **comprehensive scheme** for use of rainwater for **strengthening the drinking water sources** or storage and use of rainwater at **individual or community levels by using** the available **technologies and** through people's participation.

## **GOVERNMENT RESOLUTION :**

Considering all the aspects mentioned in the Preamble, and for sustainable availability of drinking water from the water supply schemes , Government is pleased to accord sanction to the implementation of "**Shivkalin Pani Sathawan Yojana**" (**Shivkalin Water Harvesting scheme**) providing for **conventional and non-conventional measures for drinking water source strengthening**, roof-top rain water harvesting, construction of storage tanks in the hilly areas of the villages for **storage of rain water** and similar **other measures**.

2. The **measures included** in the "**Shivkalin Pani Sathawan Yojana**", **norms for the implementation** and the **availability of funds** therefor are as given below :

### **A) MEASURES :-**

- i) Necessary measures for collecting the rainwater for drinking and other purposes by adopting roof-top rain water harvesting on all the public and government buildings in villages, towns and cities.
- ii) Measures for collecting the rainwater for drinking and domestic use by adopting roof-top rain water harvesting on private houses and structures.
- iii) Measures for constructing storage tanks in the hilly areas of villages and storing spring water for drinking and other purposes.
- iv) Measures for collection of rain water and its direct recharge into the public drinking water sources by all possible conventional and un-conventional methods.
- v) Other conventional measures, by which drinking water can be made available. (e.g. water conservation measures like desilting and deepening of tanks /wells, check dams, etc.)
- vi) Unconventional measures like jacket well, bore-blast technique, fracture seal cementation, stream blasting, recharging through borewells etc. will be implemented in selected villages / wadis of all the districts in the state.

- vii) Besides these, other scientific and technically feasible innovative methods for augmentation of water resources depending on the local situation and traditional wisdom,

**Some of the above mentioned measures have been described in brief in Annexure-I.**

**B) Above mentioned measures should be implemented as per the norms given below :**

- i) Initially this programme should be taken up as a **pilot project** in the current year in 100 villages / wadis of each of the districts in the State, from the Government and other public funds.
- ii) From the next financial year, this programme should be implemented in the State on regular basis.
- iii) There is no objection for independent implementation of the programme by the individual and public institutions / beneficiaries from their own funds.
- iv) While selecting villages, priority will be given to those villages which were tanker-fed during the last 3 years or had to be tackled by various measures under scarcity. In such villages, no other new scheme under scarcity relief or under **tanker-free** programme under implementation in the should have been taken up or where such schemes are operational but water supply is less than prevailing per capita norms.
- v) Amongst the tanker-fed villages, priority will be given to those villages which have received awards at taluka, district, division or state level under the **Sant Gadage Baba Gram Swachhata Abhiyan.(Saint Gadage Baba Clean Village Campaign)**
- vi) In addition to the award winner villages under Sant Gadage Baba Gram Swachhata Abhiyan, if the Gram Sabhas of other tanker-fed villages resolve to take up the scheme, they will be given the next priority for this programme.
- vii) Some villages, which are not scarcity affected but eager to adopt rain water harvesting, come forward, and if the villages from above mentioned priorities (i)-(vi) are not available, they will be included in this programme.
- viii) In the villages where original source has become inadequate and there is a demand for new source or a new scheme, before taking up new schemes or new sources in such villages, possibility of ground water recharge and source strengthening through rain water harvesting for solving the problem must be ascertained. If this is not possible, then only new source/scheme should be taken up.

**C) Availability of Funds :**

- i) At least 25% of the funds reserved for Sub-Mission project from the centrally assisted Accelerated Rural Water Supply Scheme and state funded Minimum Needs Programme will be spent for these measures.
- ii) In the Pilot Project Districts, which receive central assistance under Sector Reforms Programme, minimum 5% of the funds will be spent on these measures.
- iii) At least 10% from the District Maintenance & Repairs Fund of the Zilla Parishad created for maintenance of the water supply schemes will be utilised for these measures.
- iv) Funds being made available **by the XI Finance Commission** for augmentation of conventional drinking water sources shall be used for these measures.
- v) The Employment Guarantee Scheme and Assured Employment Scheme funds will be utilised for such of these measures as fit into their respective norms.
- vi) Funds as would be made available from the Local Area Development Programme Funds of M.Ps. and M.L.As.
- vii) Funds received for these measures from UNICEF and other international organisations will be used for this purpose.

**D) Guidelines for implementation of the programme :**

- (1) In the villages where these measures are to be taken, the information of existing **private and public water sources** as well as the **rainfall data** should first be compiled.
- (2) Information of **available water and its quality**, should be collected. (participation of village youth, women and students in this is expected).
- (3) **Total requirement of water** for the village should be assessed. This should be assessed by taking into consideration the combined requirements of drinking water, domestic consumption, agricultural and industrial uses and need for cattle population.
- (4) Information should be obtained regarding present use of water available in the village for above mentioned purposes. (Village should seek assistance of the technical officers from Zilla Parishad and voluntary organisations for the purpose.)
- (5) On the basis of the above information, preliminary list of the measures to be adopted for removing the gap between the available water and requirement of

water should be prepared in the **Gram Sabha**. These measures can be as given below and the decision for this should be taken by the Gram Sabha as warranted by the situation.

- a) Deciding the priority of utilization of water as per availability of water, in which first priority has to be given for drinking water.
  - b) Increasing the water charges for irrigation, drinking water and other purposes and adopting modern methods to ensure proper utilization of water.
  - c) Imposing community restrictions on the depth of wells being constructed for irrigation / community control on the present use of water.
  - d) Imposing community restrictions on the wells / borewells to be constructed for irrigation.
  - e) Taking penal action through appropriate resolution of the Gram Sabha against those who do not adhere to the stipulated utilization of the water, or causing wastage of water.
  - f) Imposing restrictions on the use of water by factories in the village and for prevention of pollution.
  - g) Taking action as per section 16 of the Groundwater Act, 1993, against those found misusing the water sources and scheme.
  - h) Making recommendations to the Competent Authority for refusing various concessions or for debarring from holding a public post, in case of those who do not abide by the decisions taken by the village in the Gram Sabha.
- (6) The Village Water Supply & Sanitation Committee designated by the Gram Sabha will compile all the above information through various means and put up before the Gram Sabha. For this, the information should be first collected on family / ward / wadi / habitation level. It will be necessary to take group-wise meetings at various levels. Separate wadi / habitation level meetings of the women will have to be taken. Assistance of the women's groups, youth groups, schools and government officials like Talathi, Gram Sevak will be taken. As per necessity, the village will also take the assistance of individuals / voluntary organisations as well as Zilla Parishad or government agencies who are conversant with the methods of compilation of such information.

- (7) After compilation of the above information and discussions thereon at various levels, it should be finally submitted to the Gram Sabha, called specifically for this purpose. After taking into consideration the above information, the Gram Sabha will prepare a **draft plan for the use of available water** in the village. In this draft plan, mention should be made regarding **measures for augmentation of water, various constructions under these measures, expenditure for the same, items to be taken up at the individual and community level, financial provisions therefor, contribution of the beneficiaries** to be obtained for individual construction, participation of the beneficiaries in the community works etc. **Stages of implementation of programme, time span and the financial, technical and management assistance expected from the Government** should also be mentioned.
- (8) Gram Sabha can invite the district or taluka level officers of the **Zilla Parishad, and Groundwater Surveys and Development Agency**, if their guidance is necessary. Gram Sabha should also discuss the decisions taken at the ward / wadi / habitation level and women's group meetings. For providing information to the Gram Sabha, regarding the advice and cooperation given by voluntary organisations / individuals, such organisations / individuals should also be invited to the Gram Sabha.
- (9) In some cases, the Gram Sabha may have to be called 2-3 times, if necessary.
- (10) After preparation of the Action Plan as mentioned above, designs and plans of the involved schemes for actual implementation should be prepared. For this purpose, assistance of Zilla Parishad, GSDA, voluntary organisations or private experts may be taken. Before taking such assistance, appropriate contract or **M.O.U.** should be made with the relevant agency, as necessary.
- (11) Agency for implementation of the programme should be decided in the Gram Sabha. This may include participation of the beneficiaries, Village Panchayat, Village level Water Supply & Sanitation Committee, and the women's group, youth group, sports group, schools, colleges, etc. in the village.
- (12) For appointing the out-side technical and works agencies for **implementation in a transparent manner, the village level Water Supply & Sanitation Committee** designated by the Gram Sabha will attend to the necessary work of **preparation of tender documents, advertisement of tenders, actual scrutiny of the tenders** received, and **taking final decision, issue of work order to the**

**selected agency, monitoring of the agency's work, purchase of material** required for the scheme as per the **procedure stipulated by the Government** or as per **rate contract, payment of the stage-wise bills of the work countersigned by the engineers appointed by the Zilla Parishad or relevant Government Department.** The Gram Sabha resolution so authorising the committee should incorporate the details of the items of work / responsibility in which full powers are given to the Committee and in which the Committee has to take the final approval by the Gram Sabha after completing the preliminary action.

- (13) The Village Water Supply & Sanitation Committee will be a **sub-committee** of the Village Panchayat. Minimum one-third members of this Committee shall be from out of the members of the Gram Panchayat; but they will be elected by the Gram Sabha only. While selecting this committee, at least 50 % women as well as appropriate number of representatives from backward communities shall be included. Similarly, it is necessary to ensure appropriate representation of each wadi / habitation falling under the Village Panchayat on this Committee. Separate meeting of the women as well as of each wadi/ habitation will have to be conducted before the meeting of Gram Sabha. In these meetings, the panel of members including women to be sent on the Village Water Supply & Sanitation Committee should be prepared and sent to the Gram Sabha. Gram Sabha will select the members for the Village Water Supply & Sanitation Committee from these panels only. Subject to maintaining the prescribed percentage and representation of women and habitations , there is no objection to the inclusion of even all the Village Panchayat members in the Village Water Supply & Sanitation Committee if the Gram Sabha so resolves. The decision as to whether the Sarpanch or anybody else should be the Chairman of the Village Water Supply & Sanitation Committee is also to be taken by the Gram Sabha. This decision is entirely in the purview of the Gram Sabha. Procedure regarding selection of the Village Water Supply & Sanitation Committee as mentioned in the Government Resolution referred at Sr.no.4 above should be followed.
- (14) Identity card should be issued to the members of the implementing and supervisory agencies. So also, the responsibility and power/authorities should be given to specific persons for lodging complaint with the police, under section 16

of the Groundwater Act, against those causing damage to the water supply sources and schemes.

- (15) As per the decision of the Gram Sabha, technical assistance of GSDA, voluntary organisations, Zilla Parishad, relevant government departments or outside experts for all the above works may be taken. For these works, the '**financial standards**' prepared by the relevant technical departments of the Government will be the '**approved standards**'. As per the local conditions, appropriate changes can be made in these, on the advice of the experts and traditional wisdom of the villagers. However, such works should be taken up only after obtaining approval of the Gram Sabha and the sanction of the committee constituted under the chairmanship of the Chief Executive Officer, Zilla Parishad, for final sanction. As far as possible the committee should not approve the expenditure beyond the standards, except with sufficient justification.
- (16) The district level committee under the chairmanship of the Chief Executive Officer, Zilla Parishad, will accord approval to the Action Plan prepared by the village and the schemes therein, as per the availability of financial provisions. For compilation of the information regarding sources in the village and preparation of the actual plan, financial assistance to the extent of Rs. 5,000/- will be given to the village and the amount will be deposited in the account of the Village Water Supply & Sanitation Committee. It will be allowed to spend this amount for survey and preparation of action plan. However, the District Committee will grant permission for withdrawal of this amount only after submission of the report.
- (17) If there is any dispute between two villages regarding use of water arising out of the action plan, it will be settled by the District Committee under the chairmanship of the Chief Executive Officer.
- (18) Special training regarding preparation of plans and compilation of necessary information will be given to some persons at the village level.
- (19) If the water sources in the village are being polluted by some factory, the responsibility for lodging complaint with the Pollution Control Board will be that of the Village Water Supply & Sanitation Committee, as per the directives of the Gram Sabha. Similarly, the responsibility for lodging complaints with the District Collector regarding creation of any water sources in contravention of

the Groundwater Act will also rest with the Village Water Supply & Sanitation Committee.

- (20) There are **conventional and unconventional** methods for augmentation of availability of water. Strengthening of sources like tanks, streams, springs, etc. can be taken up under conventional measures. As per the situation in the village, development and strengthening of drinking water sources by excavation of storage tanks in the hilly area, desilting of tanks, village tanks and impounding the springs can be taken up.
- (21) Based on the rainfall, rainwater harvesting structures on the individual houses and public buildings may be taken. These can be taken up in the areas receiving an average rainfall of more than 20 cms ( 8 inches).
- (22) The details regarding norms for **roof-top area, methods, material required and how much water can be stored** as well as the standard expenditure for that are given in the **Annexure-II of this** Government Resolution. There is scope for economising on standard expenditure by using locally available materials. Arrangements to impart training for erection of these structures will be made through GSDA, Zilla Parishads, voluntary organisations, UNICEF and individual experts.
- (23) Out of the various methods of recharge, details of the expenditure for one such method are given in **Annexure-III**.
- (24) After the approval for the Action Plan by the District level Committee under the chairmanship of the Chief Executive Officer, Zilla Parishad, appropriate funds will be made available every year by taking into consideration the total funds available. Implementation of the programme is to be done as decided by the Gram Sabha after the approval of the Committee, but only the approved works should be taken up for implementation. However, there is no objection for taking up other works from their own funds.
- (25) Inspection of various works taken up under this programme will be done by GSDA, government appointed experts, voluntary organisation and officers of the Zilla Parishad. After approval of the Gram Sabha, funds will be distributed to the concerned implementing agencies and individual beneficiaries. For this purpose, amounts will be disbursed according to the stages (mile stone) of works .

- (26) **These works can not be taken up through contractors independently and on Turn Key Basis**, but assistance of voluntary organisations can be taken. Wherever possible, works should be done at the community level. Where there is no alternative, contractors can be appointed for specific technical works, by adopting transparent methods. Labour component of these works will have to be undertaken by the concerned beneficiary in case of individual schemes and by the villagers in case of community schemes. In case of the schemes involving large component of unskilled / semi-skilled works, the village may give priority to the beneficiaries who are regularly dependent on labour work for their livelihood, for doing that part of work over and above the voluntary labour. They should be paid wages at the normal rates and their voluntary contribution in terms of their wish and as decided by Gram Sabha, may be adjusted from these wages. Those who do not wish to contribute voluntary labour, their contribution should be taken in cash from them. Since this contribution is to be taken @ 10%, Gram Sabha will have to ensure that the amount to be adjusted from the wages of those giving the voluntary labour is not more than the cash contribution. Made by others In fact, the Gram Sabha should factor in the criteria of affordability and paying capacity of each individual while deciding on their contribution towards Popular contribution.
- (27) **The material required for this scheme** should, as far as possible, be procured from the suppliers pre-qualified by Zilla Parishad and Maharashtra Jeevan Pradhikaran. For this purpose the village ( the Village Water Supply & Sanitation Committee as may be resolved by the Gram Sabha) should invite tenders and the supplier selected from these suppliers should be given the order. For technical work involved in this, the expenditure can be made on payment of fees for technical advice, to GSDA / MJP or individual experts / voluntary organisations, as decided by Gram Sabha, at the prescribed rates.
- (28) To obtain Government funds for taking up public or individual measures for rainwater harvesting and thereby **recharging the sources or creating storage of water**, the **Gram Sabha will select the public sources / buildings and individual beneficiaries**. Gram Sabha approval is, however, not necessary if any body wants to take up these schemes from their own funds. However, powers and responsibilities to ensure that such construction does not affect the

overall village management of water and for necessary intervention will rest with the Village Water Supply & Sanitation Committee and the Gram Sabha.

3. At the district level, a committee should be constituted as given below, to examine the proposals received from the Village Panchayats as decided by the Gram Sabha, and to decide the inter re priority and sanction the schemes :

1) Chief Executive Officer, Zilla Parishad	Chairman
2) District Water Supply Officer	Member
3) Deputy Chief Executive Officer (Panchayat) (Z.P.)	Member
4) Executive Engineer, Water Supply (Z.P.)	Member
5) Executive Engineer, M.I.(Z.P.)	Member
5) Education Officer (Primary) (Z.P.)	Member
6) Women & Child Welfare Officer (Z.P.)	Member
7) Expert representative of the NGO working in this field,	Member
8) Executive Engineer, Minor Irrigation (Z.P.)	Member
9) District Senior Geologist, GSDA	Member-Secretary

In addition, the Committee can invite to its meetings experts in the field, officers from related government departments, as may be necessary. This Committee can also give necessary directives to the concerned officer for planning at the village level.

4. The district level committee will take the following action on the proposals received :-

(1) Structures for recharge of public drinking water sources or **rainwater harvesting** on public places / buildings can be taken up from the funds reserved for this purpose under the **Centrally assisted Accelerated Rural Water Supply Programme**. A proposal should be prepared for this and submitted, with recommendations, to the **Technical Committee** under the chairmanship of the Secretary, Water Supply & Sanitation Department. As may be necessary, the Technical Committee may consider delegating these powers to the District Committee. After the approval of the Technical Committee, the powers for implementation of the proposal will be vested with the Village Water Supply & Sanitation Committee and Gram Sabha. At the village level, while implementing the approved proposals, the Village Water Supply & Sanitation Committee will follow the procedure laid down by the Government vide Resolutions dated 27th July 2000 and 3rd September, 2001 for implementation of water supply schemes through people's participation, so far as they are reluctant to the scheme.

(2) The schemes mentioned in the Para 1 above can also be taken **from the M.L.A. / M.P. Local Area Development Scheme Funds**. The scheme can be taken up if such measures are proposed by the concerned people's representative and if

the technical approval is given by the Committee under the chairmanship of the Chief Executive Officer. Power to accord administrative approval for such schemes will however, be with the District Collector.

- (3) The Committee under the chairmanship of the Chief Executive Officer will accord approval for taking up these measures from the funds reserved for such measures in the Sub-Mission Project under **Minimum Needs Programme**.
- (4) Measures to be taken from the funds made available for augmentation of conventional drinking water sources, from the funds made available from XI Finance Commission, will be sanctioned by the Empowered Committee under the **chairmanship of the Chief Secretary**.
- (5) Funds made available by **UNICEF** can be used for **Rainwater Harvesting structures on individual houses / buildings or recharge of private wells / borewells**. For this, **10% of the total expenditure as popular contribution** from the beneficiary (in cash, kind or in the form of voluntary labour) will be necessary. Out of the remaining, **60% from UNICEF and 30% by the State Government** will be made available from the funds reserved under various schemes. The power to sanction such structures, as per the recommendations of Gram Sabha will be vested with the District Committee under the chairmanship of the Chief Executive Officer. However, the implementation is to be done entirely by the individual beneficiary. Assistance in this connection may be taken from the **voluntary organisations or Village Panchayat**. Responsibility of supervision of these works will rest with the Water Supply and Sanitation Committee, Zilla Parishad, government appointed voluntary organisations, GSDA (as will be decided by the Government).
- (6) If the UNICEF assistance required for individual structures, as per the demand from the village is inadequate, powers to take decision for making available the entire 90 % component from other various funds mentioned above and after taking into consideration the requirement of funds for public sources, will be vested with the Water Supply & Sanitation Department.
- (7) In the pilot districts selected from Central Government's Sector Reforms Programme, this scheme will be implemented from the grants available under the Sector Reform Programme.
- (8) As mentioned above, it will be the responsibility of the District Committee to train the masons for construction of such structures. The training programme

will be organised with the concurrence of Village Panchayat. Priority for this should be given to women and youth in the village.

5. In order to make this programme successful, the Chief Executive Officer should organise **Publicity Campaign** with the help of N.G.Os. at district level. Publicity Campaign at State level will also be taken up as per necessity.

6. Henceforth, while giving permission for construction of **individual houses / public buildings / school buildings** in rural areas, the Competent Authority should not give permission unless the structure for rainwater harvesting is included. For this purpose, these restrictions will be imposed by taking into consideration the average rainfall, roof type, minimum area, material to be used, etc. in the concerned village. The action regarding the administrative orders or necessary modifications in the rules will be done separately by Rural Development Department.

7. Decision in respect of urban areas will be taken up after the study by Urban Development Department and, orders will be issued in due course of time.

8. Rainwater harvesting and recharge structures should be taken up in all Government offices and buildings in the State. Expenditure on this should be incurred from the grants received from concerned Government Department.

9. In case of any difficulties arising out of above orders / guidelines, the powers to solve the same will be with the Government.

10. This Resolution is issued with the concurrence of Rural Development & Water Conservation Department (Rural Development), and (Water Conservation & EGS)), Urban Development Department, Planning Department and Finance Department vide their U.O.R. No. 144/Exp-3 dated 30th January, 2002.

By order and in the name of the Governor of Maharashtra.

**(Sudhir Thakare)**  
**Deputy Secretary to**  
**Government of Maharashtra.**

To,

1. Secretary to Hon. Governor of Maharashtra
2. Secretary to Hon. Chief Minister of Maharashtra
3. Secretary to Hon. Deputy Chief Minister of Maharashtra
4. Hon. personal Assistant to Minister (All)
5. Hon. personal Assistant to State Minister (All)
6. All Divisional commissioners
7. Member Secretary (Administration) Maharashtra Jeevan Pradhikaran Mumbai
8. Member Secretary (Technical) Maharashtra Jeevan Pradhikaran Mumbai

9. All District Collectors
10. All Chief Executive Officers of Zilla Parishadas
11. Accountant General, maharashtra -1 Mumbai (Audit/Accounts & Entitlement)
12. All Chief Accounts & Finance officer, Zilla Parishad,
13. Accountant General, maharashtra -2 Nagpur (Audit/Accounts & Entitlement)
14. Chief Auditor, Local Fund Account New Mumbai
15. All Deputy Chief Auditor, Local Fund Account
16. All District Treasury officer
17. All Regional Chief Engineers of Maharashtra Jeevan Pradhikaran
18. All Supretending Engineers of Maharashtra Jeevan Pradhikaran
19. All District Water Supply Officers of Maharashtra Jeevan Pradhikaran
20. All Executive Engineers of Maharashtra Jeevan Pradhikaran
21. All Executive Engineers, Water Supply Divisions of Zilla Parishad
22. Director, Ground Water Survey & Development Agency, Pune
23. All Regional Deputy Director, Ground Water Survey & Development Agency
24. All District Senior Geologists, Ground Water Survey & Development Agency
25. Planning Department, Mantralaya, Mumbai
26. Finance Department, Mantralaya, Mumbai
27. Rural Development Department, Mantralaya, Mumbai
28. All Departments in Mantralaya
29. All Controlling Officers of Water Supply & Sanitation Department & All Desks
30. Select File (W.S.-07), Water Supply & Sanitation Department

## **ANNEXURE - I.**

### **Brief Description of various proposed measures.**

#### **(1) Rainwater Harvesting :-**

The villages / wadis / habitations which do not have any water source in the vicinity and the water supply scheme would be difficult / very expensive can be considered for *In-situ* rainwater harvesting. In the areas of Maharashtra State, where water supply by any other measures is not possible, in tribal areas, hilly areas of Konkan, and the areas receiving minimum of 200 mm rainfall, these measures can be adopted for storage of rain water and its use in summer and scarcity period. Rain water can be stored in the underground tank or in the surface tank. Augmentation of water is also possible by recharge.

##### **1.1 Roof Top Rainwater Harvesting :**

A) In the areas, where rainfall is adequate (average annual of 200 mm) and lasts for some times and where there is water shortage for 3 to 4 summer months, problem of drinking water can be solved by roof top rainwater harvesting.

For this method, the roofs are required to be of G.I. sheets, aluminum sheets, tiles, Asbestos sheets or cement concrete. Thatched roofs are not suitable. At the lower tapering end of the roof, a pipe is fixed for collection of water. This is inclined towards the vertical pipe connected to the ground level storage tank. This pipe is made of G.I. sheets / Bamboo / P.V.C. or locally available material. Vertical pipe attached to the storage tank is usually of 100 mm dia. with a wire-mesh attached to its lower end. This prevents the dry leaves and other dirt / unwanted matter from entering the storage tank and thereby clean water is stored in the tank. **(Annexure-4, Fig. 1 & 2)**

The dirt, bird droppings accumulated on the roof during non-rainy season is washed by the first rains and in order to prevent its entry into the tank (a) the vertical pipe connected to the storage tank is kept away until the clean water comes through it or a separate tap is attached for letting the washed water flow away. (b) An arrangement is made for storage of this unclean water before its entry into storage tank. Storage tank can be either below the ground or on the surface. These tanks can be of G.I. sheets, R.C.C., plastic or Ferro-cement. If the tank is below the

ground, a handpump is required for lifting the water. The water in the tank can be kept bacteria-free by frequent use of bleaching powder.

If adequate care is taken, the water can be kept bacteria-free and potable for a long time (up to 1 year). If the storage tank is on the surface, it will be necessary to cover the tank with a mesh, and fencing it to prevent the contact with birds and animals. It is necessary to paint the inside of the tank, with moss resistant paint. Water will have to be filtered and chlorinated before using for drinking purpose.

### **1.2 Guidelines for the Users:**

- i) There should not be any accumulation of any dust, soil, bird droppings, dry leaves, etc. on the roof and in the gutter. If the roof and the gutter are kept clean, the quality of the water collected from the roof can be maintained.
- ii) The gutter and the roof should be cleaned often and the accumulated waste and dry leaves should be removed.
- iii) Tie a fine cloth on the outlet of the tap, so that the mosquitoes do not enter the storage tank.
- iv) Keep the storage tank clean.
- v) Use the water carefully for drinking and avoid wastage.
- vi) Monitor the quality of the water and ensure that there is no growth of bacteria in it.
- vii) Bleaching Powder/TCL powder should be put in the tank, where the water is used for drinking purpose.

### **1.3 Advantages of Roof Top Rain Water Harvesting:**

- i) Water is stored when available in plenty and is used in the scarcity period.
- ii) Since the storage is near the individual's house or in the habitation, its redistribution is easy and convenient.
- iii) Quality of this water is much better than that of the undeveloped traditional storage.

### **1.4 Annual Maintenance:**

Annual cleaning, maintenance and repairs should be attended to at the end of the summer when the storage tank is almost empty.

- i) Remove the filtration unit, clean and dry it. If necessary replace the filtration unit, and tank.
- ii) Thoroughly scrub the inside of the tank and remove the accumulated silt with clean water. Keep a piece of cloth on the outlet of the tap and drain the water.
- iii) Check the roof top, gutter, gutter fittings and attend to the repairs if necessary.
- iv) Check the walls of the gutter and fill the holes to stop the leakages.
- v) Get the water tested for the bacteria.
- vi) It is necessary to repair the leakage spots noticed in the previous season. The damp patches on the sides of the wall should be plastered with cement mixture

(Mix 1 part of cement in 2 parts of water for plastering). If there is leakage but no damp patches on the wall are observed, then bottom of the storage tank should be plastered with the mixture of 1 part sand, 2 parts cement and 4 parts water.

### **1.5 Bacteriological test:**

- i) Bottles containing culture media would be made available.
- ii) Fill the bottle up to the marking with water.
- iii) Keep the bottle at body temperature for 12 to 18 hours.
- iv) There are no bacteria in the water if the colour does not change.
- v) If there is colouration in the water, then the presence of bacteria in the water is likely.

### **(2) Jacket well:**

2.1 Availability of water in source of the Drinking Water Supply Scheme depends on the geology of the area. Porous rocks beneath the surface store the water and the joints and fractures in the rocks help in the flow of this groundwater. If such favourable condition occurs naturally in the vicinity of the source well, adequate supply continues from the well through groundwater recharge. However, at some places the porosity in rocks is basically less. The joints and cracks are also not naturally interconnected. Hence, the inflow process of water slows down. This results in inadequate availability of water from the well and creates scarcity over a period of time (**Annexure – 4, Fig. 3**).

2.2 **Jacket well** technique is used for artificially creating the porosity in rock and improving the yield of the source well. In this technique, depending on the geological conditions. The depth of bore holes is up to or less than the depth of the source well. The bore holes are blasted with explosives. Due to the blast, the storativity of the underground rocks increases and the cracks and joints are connected to the well. These results in the increased flow of water towards the wells and in turn increased yield from the well. The expected expenditure for this project is around Rs. 40, 000 to 45,000.

### **(3) Bore Blast Technique:**

In spite of the assured or above normal rainfall, the groundwater based sources in some areas go dry earlier in the summer season, due to low porosity of rocks. Bore Blast Technique is used for artificially increasing the porosity and permeability of the rocks. In this technique, boreholes of required depth are drilled in

the vicinity of the source, and blasted with explosives. This helps in increasing the porosity and creating groundwater storage. By constructing a dug well or drilling a bore well fitted with hand pump, water can be made available to nearby habitation. This can benefit mainly the wadis/habitations with small populations, during difficult times (**Annexure 4, Fig. 4**). The expected expenditure for this project is around Rs. 35,000 to 40,000.

#### **(4) Fracture Seal Cementation:**

4.1 The flow of groundwater depends on the porosity, joints and cracks and their inter-connectivity in the underground rocks. Due to certain physiographic and geological setting there is continuous flow of groundwater and the well cannot retain the expected water. Hence, in order to restrict the flow, the cracks and joints on the down stream of the well are closed by this specific technique. This creates a sort of impervious wall resulting in reducing the groundwater flow, which in turn increases the capacity of the well and helps in alleviating the drinking water problem (**Annexure 4, Fig. 5**).

4.2 Most of the source wells of Pipe Water Supply Schemes are located along the nala/stream bank. At such places, on the down streamside of the source, bore holes are drilled, at desired distance, across the width of the stream. Cement slurry is injected under high pressure in these bore holes which closes the interconnected cracks and fractures creating a barrier wall, and impeding the flow of groundwater.

#### **(5) Stream Blasting:**

Most of the source wells are located along the nala/stream bank. At places where the subsurface flow of water in the stream is not connected to the source well it is not useful for the well. The Stream Blasting technique is useful for artificially channeling the sub-surface water flow below nala bed and connecting it to the source well on the nala bank.

In this technique, required number of bores, depending on the geological formation, are drilled in the nala bed and blasted with explosives. This creates

artificial fractures and joints as well as the existing fractures and joints are extended and inter connected, which helps in creating additional groundwater storage. The groundwater flow below the nala bed is connected to the source well, thereby increasing the groundwater availability in the well.

The expected expenditure of this project is around Rs. 35,00 to 40,000 (**Annexure 4, Fig. 6**).

#### **(6) Artificial Recharge of Groundwater through Borewell flooding:**

6.1 Due to excessive withdrawal and inadequate recharge in certain areas, the groundwater levels deplete or aquifer goes dry. Due to this the yield from good capacity borewells are reduced.

6.2 If the surface runoff during four months of monsoon season is impounded by conventional method, shallow aquifer can be recharged. If this stored water is let into borewell by pumping or siphon method, it recharges the deeper aquifer which have gone dry due to excessive withdrawal. It is possible to store the excess groundwater run off from shallow zones for future use. Similarly, if the surface water is used for recharging through borewell, the evaporation is avoided and 100% water is available for use. Bacterial contamination of surface water storage is also avoided.

6.3 All the borewells are not suitable for artificial recharge. The borewells proposed for this should have had high yield and the water level has now depleted due to excessive withdrawal. In some areas, due to earlier overexploitation, the new bore wells also do not get water, in spite of the favourable hydrogeological situation. Such borewells are also suitable for artificial recharge. It is appropriate to select borewells for artificial recharge in the areas where the borewells are drilled on large scale for drinking water as well as by cultivators for irrigation purpose and extensive withdrawal of groundwater is made.

6.4 It is necessary that the water used for recharging should be clean and free from any contamination. Since this water will be stored in the deeper aquifer, subsequent disinfection would be difficult. Hence, it is necessary that the water be treated with

bleaching powder. If stored water is to be used for recharging, it is advisable not to use directly, but treat it with bleaching powder in a filter pit or trench gallery (**Annexure 4, Fig. 7, 8, 9**).

**(7) Conventional measures**

**a) Desilting of tanks/wells:**

Silt accumulates in the tanks/wells with the inflow during rainy season. Over a period of time, due to accumulation of the silt, the storage capacity as well as the yield of tank/well get diminished and the very purpose of their construction is affected. Hence, the desilting of tanks/wells is necessary.

**b) Deepening of wells:**

A well that has good water level at the time of construction depletes during scarcity condition. In order to increase yield from such a well, it is necessary to deepen the well.

**c) Construction of check dams:**

It has been established that the construction of check dams in streams/nalas is economical and least cost measure for arresting velocity of surface flow during monsoon. The soil is arrested by the check dams and stops further erosion, and since the water is impounded in the dam, it helps in increasing the groundwater levels, thereby increasing the well yields.

**d) Village Tank**

Village tanks useful for drinking water purpose can be taken from these funds.

**e) Other Conventional recharge/conservation works:**

Any other works by which drinking water sources can be strengthened, and which will be sanctioned by the district level committee under the chairmanship of the Chief Executive Officer, Zilla Parishad.

## Annexure-II

### Details of Roof Top Rainwater Harvesting Work

#### **(1) Important components of Rainwater Harvesting:**

- a) Roof: Tiled, Asbestos, Cement concrete, G. I. sheet, etc. are suitable for rainwater harvesting. Thatched roof or (mud) roof through which water seeps are not advisable.
- b) Various components of harvesting system: Gutter, Pipe (for letting off the initial dirty water and for transporting pure water to storage tank), filter unit, storage tank (collection tank), lid for storage tank, storage tank manhole, drain hole, overflow hole, collection pit.

#### **(2) Conditions conducive for harvesting:**

- a) Considering the variation in the rainfall in the State, it is possible to use different sizes of storage tanks for in-situ rainwater harvesting.
- b) It is neither envisaged to harvest rain water and use it for perennial purpose, nor is it possible. In the State 20,000 habitats face acute water scarcity during 6 months from December to may. On an average, 5500 habitations are requires being supplied water by tanker, every year. The women in these habitations are required to fetch drinking water from a distance of 4-5 km during scarcity period. Even it is not certain if this water is pure, since it is obtained by digging pits in the streams, nalas, and riverbeds. As the need of drinking water can be fulfilled in-situ by roof top rainwater harvesting in such acute scarcity wadi/habitations, it is recommended to take up this at such places.

#### **(3) Storage and availability of water in Storage Tanks:**

- a) Formula for possible harvesting at a specific place is given below:

##### Formula:

Water that will be available (in liters)= Annual Rainfall (in mm) x Area of Roof Top (m<sup>2</sup>) x Run-off constant of the roof.

- b) The run-off constant of the roof depends on the material used for the roof. Based on the general experience this run-off constant for various materials is determined as below:

i) G. I. Sheet	0.9
ii) Asbestos	0.8
iii) Tiles	0.75

- iv) Cement Concrete      0.7
- v) Thatched (Grass)      0

c) Capacity of the storage tank is to be determined as per the following formula:

Volume of the Storage Tanks (in liters) = No. of persons in the household x Scarcity  
Period (in days) x Per day per capita  
requirement of drinking water (in liters)

(4) How to determine the volume of Storage Tank is explained with an example given below:

Assuming

- a) No. of persons in a household : 5
- b) Scarcity period : 120 days
- c) Per capita per day requirement of drinking water : 5 liters
- d) Average annual rainfall : 200 mm (considering the minimum rainfall area of the State)
- e) Roof Top Area : 20 sq. m (minimum Roof Area available for house under Indira Housing Scheme)
- f) Runoff Constant of the Tiled Roof : 0.75 ( This is considered since the tiled roof are common in the villages)
- g) As per the above data, the water that will be available from the roof :  $200 \times 20 \times 0.75 = 3,000$  litre

As per formula given on 3(a) above = (d) x (e) x (f)

**This means that 3,000 liters of water can be harvested from the roof of the smallest house in the lowest rainfall area of the State.**

How long will this water last?

Volume of the Storage Tank =  $5 \times 120 \times 5 = 3,000$  liters

(as per the formula in 3© (a) x (b) x (c)

**This means that 3,000 liters of water can be harvested from the roof of the smallest house in the lowest rainfall area of the State and a family of 5 persons can use this for drinking purpose @ 5 liters for 120 days.**

(5) In order to construct the tank in smallest area, it is necessary that it should be possible to construct with a minimum difference of 2' between the height of roof and tank. In view of this, various dimensions of tanks are given below:

Capacity of Tank (in liters)	Diameter of circular Tank (in meters)	Required height of Tank (in meters)
5,000	2.00	1.60
6,000	2.00	1.90
7,000	2.30	1.70
8,000	2.30	1.90
9,000	2.60	1.70
10,000	2.60	1.90

(6) **Details of Average cost for Rainwater Harvesting**  
(Based on rates for Year 2000 – As per Unicef Manual)

**Amount in Rs.**

Item	5000 Ltr	6000 Ltr	7000 Ltr	8000 Ltr	9000 Ltr	10000 Ltr
<b>Storate Tank</b>	7600	8090	9070	9470	10380	10835
<b>Filter Unit</b>	350	350	350	350	350	350
Gutter	3000	3000	3000	3000	3000	3000
<b>Down Pipe &amp; Flush Pipe</b>	750	750	750	750	750	750
Total Cost	11700	12190	13170	13570	14480	14935
Cost/Ltr	<b>2.34</b>	<b>2.03</b>	<b>1.88</b>	<b>1.70</b>	<b>1.61</b>	<b>1.49</b>

**Labour component of the above expenditure -**

**Amt. in Rs.**

	5000 Ltr	6000 Ltr	7000 Ltr	8000 Ltr	9000 Ltr	10000 Ltr
<b>Skilled</b>	2100	2225	2425	2500	2700	2775
<b>Un-skilled</b>	1500	1600	1725	1800	1925	1975

(7) **A) Material commonly required for rain water harvesting structure -**

- i) Cement
- ii) Sand
- iii) Stone
- iv) Rubble
- v) Bricks
- vi) Mild Steel
- vii) G.I.Sheet plain
- viii) Nut bolts.

**B) Skilled and Un-skilled man power -**

- i) Mason
- ii) Fabrcator
- iii) Bar-bender
- iv) Unskilled labour.

(Note : Training of 7-8 days is sufficient for above works)

**Annexure - III**  
**Recharge to Groundwater by using surface run-off.**

Surface run-off can be stored by specific method and diverted to well / borewell. This can accelerate the recharge process.

Surface run-off can be diverted and stored in a pit (2 m x 2 m x 2 m) and let into the borewell / well through pipe. The design for this is attached (Annexure-4, Fig. 2). Water from the water-logged area can also be diverted to the pit through channel.

		<b><u>Estimated Expenditure</u></b>	
<b><u>Sr.No.</u></b>	<b><u>Items</u></b>	<b><u>Rate (Rs.)</u></b>	<b><u>Exp. (Rs.)</u></b>
1)	<b><u>Excavation of pit of 2m x 2m x 2m</u></b>		
	A) 2m x 2m x 0.5m (Soil cover)	95 per M <sup>3</sup>	190/-
	B) 2m x 2m x 1.5 m (Murum layer)	125 per M <sup>3</sup>	750/-
		<b><u>Total Rs.</u></b>	<b><u>940/-</u></b>
2)	Plastering of 5 sides of 2m x 2m	<b><u>65/Sq.M</u></b>	<b><u>1300/-</u></b>
3)	Filter bed (0.60 m thick ) (Mixture of gravel, sand)		
	a) Gravel 2m x 2m x 0.2 m	350 per M <sup>3</sup>	280/-
	b) Coarse sand 2m x 2m x 0.2 m	300 per M <sup>3</sup>	240/-
	c) Fine sand 2m x 2m x 0.2 m	200 per M <sup>3</sup>	160/-
		<u>Rs.</u>	<u>680/-</u>
	d) Labour		204/-
		<b><u>Total Rs.</u></b>	<b><u>884/-</u></b>
4)	Drain chamber (Near the pit) (0.90 m x 0.45 m x 0.60 m)		<b><u>650/-</u></b>
5)	PVC pipe (4" dia) from surface storage to pit 5m (Approx) From bottom of pit to borewell / well 5 m (Approx.) (Length of the PVC pipes would vary as per situation.)	100 / M	1000/-
	<b>Total (1 + 2 + 3 + 4 + 5)</b>		<b><u>4774/-</u></b>
		<b><u>Say Rs.</u></b>	<b><u>5000/-</u></b>
		<b><u>Rs.625/- per M<sup>3</sup></u></b>	
Labour component of the above	(1)		Rs. 940/-
	25% of (2)		Rs. 325/-
	(d) (3)		Rs. 204/-
	25% of (4)		Rs. 160/-
		<b><u>Total</u></b>	<b><u>Rs. 1629/-</u></b>